openreach

SIN 171

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Suppliers' Information Note
For The Openreach Network

BT ISDN 2

(Using *limited ETSI Call Control)*

SERVICE DESCRIPTION and WITHDRAWAL NOTIFICATION

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1. GENERAL

1.1 This Suppliers Information Note (SIN) describes the "BT ISDN 2" service (I.420 Basic User-Network Interface) which is supported on the limited ETSI call control platform. It is intended to provide general information about the service for apparatus manufacturers and developers.

1.2 An overview of all of the ISDN services provided by BT is given in SIN 312.

1.3 Abbreviations are contained in paragraph 9.

2. SERVICE AVAILABILITY

2.1 National deployment commenced in January 1991; with the provision of service to customers, subject to operational availability.

2.2 **This issue of the SIN announces that BT withdrew the service during 2008.**

2.3 The BT ISDN 2 (I.420) Service, (supported on the limited call control platform) was designed and implemented prior to the completion of the European ISDN Standards published by the European Telecommunications Standards Institute (ETSI). BT has now launched the BT ISDN 2e (I.420) Service supported on a full ETSI call control platform which is described in SIN 261.

Following the service launch of BT ISDN 2e, all standard new provision of ISDN basic access services are on the *full ETSI call control* network platform. This includes additions to existing ISDN 2 (I.420) service which have previously been provided on the *limited ETSI call control* network platform (a small number of exchanges equipped with UXD5 technology will continue to have ISDN 2 offered as the only available basic access service until a viable technology that can offer ISDN 2e is available for these sites). ISDN 2 and ISDN 2e cannot technically be provided as part of the same hunt group. If existing ISDN 2 hunt groups need additional channels then they will need to be upgraded to ISDN 2e.

Both the *limited ETSI call control* network platform and the *full ETSI call control* network platform support the ISDN user-network interface to the ETSI international standards and hence network platforms will support the same approved ISDN CPE albeit with some restrictions, see SIN 261 Section 2.2.

3. INTERFACE DESCRIPTION

3.1 The interface has been designed so that apparatus complying with the requirements of NET 3 (which was superseded by CTR 3) will be afforded a level of service compatible with that described in the following ETSI Documentation.

ETS 300 012	April 1992
ETS 300 099	August 1992
ETS 300 125	September 1991
ETS 300 102 Part 1	December 1990
ETS 300 102 Part 2	December 1990

BTNR 191, Issue 2, October 1990, Volumes IA to 4 provides a detailed specification of the interface. Since the publication of BTNR 191, a number of upgrades (as notified in SIN 171, Issue 7) have been implemented and these are detailed below (All references to BTNR 191 refer to BTNR 191, Issue 2, October 1990 including the *BT Notes* and *BT Requirements* published in that document.)

3.1.1 LLC Handling

BTNR 191, Part 1, Volume 3, page "iv" imposed the operational restriction that the BT implementation would ignore the Low Layer Compatibility information element when received in an outgoing SETUP message from the user.

The upgrade removes this operational limitation such that the network now handles LLC according to the specification in 4.5.18 of BTNR 191.

3.1.2 Treatment of Dummy Call Reference

The BT implementation does not support the use of the Dummy Call reference and there are currently no plans to introduce this capability.

BTNR 191, Part 1, Volume 3, page "v" (October 1990) imposed the operational restriction that the network would respond to a received message containing a Dummy Call reference by returning a RELEASE message.

The upgrade removes this operational restriction so that the network now acts in accordance with *BT Requirement 1*, page 48 of BTNR 191, Part 1 Volume 3 (October 1990), i.e. the network ignores any message containing the Dummy Call reference and does not return a RELEASE message.

3.1.3 Recognition of Sending Complete

BTNR 191, Part 1, Volume 3, Page "v" imposed the operational restriction that the network would neither:

a) recognise the Sending Complete information element in a SETUP message; nor,

b) include a Sending Complete information element in a SETUP message sent to the user (Note overlap receiving is not supported).

The upgrade removes this restriction so that now:

i) en-bloc procedures for outgoing calls for the user will apply as described in 5.1 of BTNR 191, Part 1, Volume 3;

ii) for incoming calls to the user, the network will comply with *BT Requirement 4* in Page 157 of BTNR 191, Part 1, Volume 3 (i.e. the network will include the Sending Complete information element in all SETUP messages sent to the user). The position of the Sending Complete information element will be as shown in 3.1.1.6 of BTNR 191 although suppliers are reminded that single octet information elements may appear at any point in a message (see BTNR 191, 4.5.1).

3.1.4 Treatment of High Layer Compatibility Message Element

BTNR 191, Part 1. Volume 3, Page "v" imposed the operational restriction that the network would reject outgoing call requests in which the SETUP message received from the user contained a High Layer Compatibility information element with a codepoint in the High Layer characteristics identification information field that is not supported by the BT implementation.

The upgrade will remove the restriction in BTNR 191 so that the procedure specified in clause. 4.5.16 of BTNR 191 will apply (in particular, the network will ignore HLC codes not supported by the BT implementation and will continue with the outgoing call).The network's action will therefore become consistent with the standard treatment of messages having a non-mandatory information element error (clause 5.8.7.2 of BTNR 191).

3.1.5 Treatment of Reserved Progress Indicator Codes

BTNR 191, Part 1 Volume 3, Page "v" imposed the operational restriction that the network implementation would reject an outgoing call request for a 3.1kHz audio call in which the SETUP message contained a Progress Information element with a codepoint in the Progress Descriptor that is not supported by the BT implementation.

The network upgrade removes this restriction such that any Progress Indicator received with a Progress Descriptor value other than "1" or "3" will be discarded without leading to the rejection of the outgoing call from the user (see clause 4.5.22 of BTNR 191).

The network's action will therefore become consistent with the standard treatment of messages having a non-mandatory information element content error (see clause 5.8.7.2 of BTNR 191).

3.2 The customer interface is presented to the user via an NTTA offering two parallel sockets for connection of terminals directly to the service or by the addition of customer provided wiring. The requirements for the cabling between the CPE and the NTTA, including passive bus configurations are specified in EN 50098-1.

3.3 Initially the NTTA will be line powered. Locally powered options may be provided at a later date. The service provides only power source (PS) 1 "restricted" in accordance with ETS 300 012. In those cases where terminals do not provide their own power supply, provision exists for the local use of an external PSI "normal" to provide power for several terminals. The NTTA facilitates such connection if required at the expense of one of the sockets provided, otherwise the PSI "normal" may be connected via a socket on a passive bus. {SIN 173 and 175 are now covered by standards and hence have been withdrawn.}

3.4 Annex A describes the expected facilities available.

4. INTERWORKING WITH OTHER SERVICES

For ISDN interworking with other services see SIN 261.

Further information specific to international interworking between the BT ISDN service and overseas ISDNs is available in SIN 243.

5. CONTACT POINTS

Contacts for further information about the BT ISDN service can be found at
https://www.openreach.co.uk/orpg/home/helpandsupport/sins/sins.do

If you have questions relating to this document then please contact orsinsfa@openreach.co.uk

6. ABBREVIATIONS

BTNR	British Telecommunications Network Requirement
CEPT	Conference of European Posts and Telecommunications
ETS	European Telecommunications Standard
ETSI	European Telecommunications Standards Institute
ISDN	Integrated Services Digital Network
ITEC	ISDN Terminal Equipment Compatibility Laboratory
NET	Norme Europeen de Telecommunication
NTTA	Network Terminating and Testing Apparatus
PN	Presentation Number
SIN	Supplier Information Note

7. REFERENCES

Norme Europeen de Telecommunication

NET 3 Part 1: Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access	1988

CEC

CTR 3: ISDN Basic Access; CPE Attachment Approval Standards	May 1997

European Telecommunication Standards

ETS 300 012: ISDN: Basic user-network interface Layer 1 specification and principles	April 1992
ETR 026: Network Aspects (NA); Terminal selection principles for priority I and II services of MoU - ISDN, applicable in multi-terminal environments at customer premises	May 1992
ETS 300 050: Integrated Services Digital Network (ISDN);Multiple Subscriber Number (MSN) supplementary service description	October 1991
ETS 300 051: Integrated Services Digital Network (ISDN); Multiple Subscriber Number (MSN) supplementary service; Functional capabilities and information flows	October 1991
ETS 300 052-1: Integrated Services Digital Network (ISDN); Multiple Subscriber Number (MSN) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol;	October 1991
ETS 300 099: Integrated Services Digital Network (ISDN); Specification of the Packet Handler access point Interface (PHI)	August 1992
ETS 300 102-1: Integrated Services Digital Network (ISDN); User-network interface layer 3; Specifications for basic call control	December 1990
ETS 300 102-2: Integrated Services Digital Network (ISDN); User-network interface layer 3; Specifications for basic call control; Specification Description Language (SDL) diagrams	December 1990
ETS 300 104: Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access Layer 3 aspects	July 1991 + Amendment 1 (6/94) (Net 3 part 2)
ETS 300 122-1: Integrated Services Digital Network (ISDN); Generic keypad protocol for the support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification	March 1992
ETS 300 125: Integrated Services Digital Network (ISDN); User-network interface data link layer specification; Application of CCITT Recommendations Q.920/I.440 and Q.921/I.441	September 1991
I-ETS 300 245-1: Integrated Services Digital Network (ISDN); Audio-visual services; Videotelephone systems and terminal equipment operating on one or two 64 kbit/s channels	February 1996
TBR 8: Integrated Services Digital Network (ISDN); Telephony 3,1 kHz teleservice; Attachment requirements for handset terminals	September 1994

Suppliers' Information Notes

SIN 312	BT ISDN Services - Overview
SIN 243	ISDN International Interworking
SIN 261	BT ISDN 2e and ISDN 30e Service using full ETSI call control.

BT Network Requirements (BTNRs)

BTNR 191, Issue 2,	October 1990, Volumes 1A, 2, 3 and 4

For further information or copies of referenced sources, please see document sources at: http://www.btplc.com/sinet/

8. HISTORY

Issue 1	November 1989	
Issue 2	December 1989	Annex 3, Clause 2(b) changed Annex 3, Clause 3(c) changed
Issue 3	January 1990	Pages 2 and A3-2, Correction of printing error Pages 2 to 5, Amendment to page footing Annexes 1 to 3, Removal of page heading and Amendment to page footing
Issue 4	August 1990	Para 2, I-t sub-para re-worded Para 3, 3rd sub-para re-worded Para 6 re-worded Para 7 added Minor editorial changes throughout ETS references updated Annexes 1 to 3 minor changes Annex 4 added
Issue 5	April 1991	Revised at commencement of national rollout phase. ETS references updated. Information on Designated Terminals added. Information added on "Sending Completion procedures. Supplementary service availability information updated. Information on access to other networks updated.
Issue 6	November 1991	Annex 4 updated to include details of the Basic Rate Hunting facility. Annex 3 deleted.
Issue 7	August 1992	Revised to include references to BABT/SITS/92/48. More details of the Hunting facility included. Amendments to reflect the Drop 3 upgrade of the BT network.
Issue 8	July 1998	Revised to include changes due to rollout of ISDN 2e Service. Incorporation of "Issue 07 amendment A" and SIN 256. Annex 1 changed to A. Annex 4 changed to B. Annexe's 2 and 3 deleted. See new Annex C for other changes.
Issue 8.1	February 1999	Editorial changes only, see Annex C
Issue 8.2	November 1999	Editorial changes only, see Annex C
Issue 8.3	May 2002	Editorial changes only, see Annex C

Issue 8.4	April 2003	Approval Requirements statement removed, information available via SINet Useful Contacts page.
Issue 9.0	November 2006	Announcement of service withdrawal.
Draft 9.1	June 2008	Update of withdrawal date. Editorial updates.
Issue 9.2	January 2014	Changes to reflect the completion of BT's withdrawal from service.
Issue 9.3	January 2015	Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/
Issue 9.4	September 2020	Changes to branding, from BT to Openreach including changes to reflect new Openreach SIN site and Openreach SIN email address
Issue 9.4	September 2021	Annual Review – no changes required – issue remains unchanged.
Issue 9.4	September 2022	Annual Review – branding and font changes only – issue remains unchanged.
Issue 9.4	October 2023	Annual Review – branding and font changes only – issue remains unchanged.
Issue 9.4	January 2025	Annual Review – branding and font changes only – issue remains unchanged.

ANNEX A - SERVICE FACILITIES

A1 INTRODUCTION

This Annex describes the services provided on the BT ISDN 2 (I.420) Service.

NOTE: Annex B provides without prejudice, non-regulatory, information of general interest to manufacturers.

A2 BEARER SERVICES

- 64 kbit/s unrestricted bearer service
- Speech mode bearer service
- 3.1 kHz audio bearer service

A3 DIRECTORY NUMBER ALLOCATION

Five types of numbering arrangements are provided. As notified in SIN 256, two of these numbering options (see below) are not available on new orders for ISDN 2.

A3.1 A separate directory number is allocated per basic access (i.e. one directory number serves the two B-channels).

A3.2 One directory number per B-channel is provided. As notified in SIN 256, this service is not available on new orders for ISDN 2.

A3.3 Multiple Subscriber Numbering (MSN) facility is available as described in ETS 300 050, ETS 300 051 and ETS 300 052 together with BTNR 191, Issue 2, Part 1, Volume 4. (See Annex A7.5)

A3.4 Bypass Number, this service is available should customers wish to bypass the hunting facility on ISDN 2. It can also be used to bypass the "Administration Controlled Call Diversion" facility. As notified in SIN 256, this service is not available on new orders for ISDN 2.

A3.5 DDI number ranges are available (see Annex A7.4)

A4 SERVICES AUTOMATICALLY AVAILABLE

These services are available to customers without having to request them from BT.

A4.1 Terminal Portability

This service is available on all bearer services but without a "Notify" message.

A4.2 Terminating Line Identity Display

This service provides the delivery of the line identity from the called party to the calling party on answer. It does not provide the line identity of the connected party when that is different to the called party. For example after diversion the line identity received would be that of the diverting party and not that to which the call has been diverted. It uses stimulus signalling. This service is not compatible with Calling Line Identification Presentation (CLIP) as provided on ISDN 2e, using the *full ETSI call control* platform (SIN 261).

As notified in SIN 256, this service is not available on new orders for ISDN 2.

A4.3 Teleservices

Telephony, Teletex, Group 4 fax and Group 2/3 fax Teleservices are supported.

A5 BT CONTROLLED FACILITIES

These services are available to customers on request. A connection fee may be made.

A5.1 Outgoing only channels / Incoming Call Barring (ICB)

A5.2 Incoming only channels / Outgoing Call Barring (OCB)

A5.3 Selective barring of Outgoing calls

A5.4 Calling Line Identity Restriction (CLIR)

Customers can request that their line identities (telephone number) are not released to ISDN customers that they are calling. This service is available free of charge when ordered at the same time as the line(s).

Customers without CLIR activated can implement CLI restriction on a per call basis by dialling 141 as a prefix before the directory number of their outgoing call.

Customers that have CLIR activated can release their CLI on a per call basis by dialling 1470 as a prefix before the directory number of their outgoing call.

When CLIR is activated, TLID will not be forwarded.

A5.5 Administration Provided Diversion (formerly Administration Controlled Diversion)

These services are provided by BT at the request of the user, there will be a charge for the provision and renting of these services. These services are available for all calls except 64 kbit/s unrestricted Bearer Services; 64 kbit/s unrestricted calls will not be diverted but will be put through to the called number. The diverted leg of the call will be charged to the customer invoking the diversion services.

A5.5.1 Basic Diversion

The service allows a customer to have calls on a channel or a group of channels to be diverted to another number.

A5.5.2 Diversion on No Reply

This service automatically diverts incoming calls to another number if the customer does not answer the call within approx. 15 seconds.

A5.5.3 Diversion on Engaged

This service automatically diverts incoming calls to another number if the customer's access is already engaged.

A5.6 Malicious Call Indication (MCI)

This service is only made available for use at the discretion of BT's Malicious Calls Investigation Bureau.

MCI uses stimulus signalling as defined in BTNR 191, Part 1, Volume 4, Section 2.4 between the CPE and the network to allow the user to invoke the MCI facility. This service is an application of the standardised Generic Keypad Protocol and is invoked when the exchange receives the code "*39#" in a Keypad facility information element in a **single** INFORMATION message (Note: as notified in SIN 256, the capability of sending the "*39#" in overlap mode has been withdrawn).

A6 DIGITAL CALLING FEATURES (DIGITAL SELECT SERVICES)

NOTE: From 1st September 1999, all supplementary services provided on BT's ISDN Services were re-branded as "Digital Select Services". Following a rebranding exercise these services are now called Digital Calling Features.

These services are available to customers on a chargeable basis.

A6.1 Calling Line Identity Presentation (CLIP)

The delivery of calling line identities are available as a Digital Select Service.

A6.2 Sub Addressing

The customer is restricted to 6 alpha numeric characters, (although some international interworking is restricted to 4). The destination end rents the service from BT.

A6.3 Three Way Service

The service is available on rental terms and the third leg of a Three Party Call will be charged on usage. As notified in SIN 256, this service is not available on new orders for ISDN 2.

A6.4 DDI Facility

A6.4.1 DDI (Direct Dialling In) can be applied to a group of ISDN 2 lines and allows incoming calls to a Basic Rate PBX to be routed directly to an extension or appropriate CPE without going via the PBX operator. The number of ISDN 2 lines (each line is made up of two B-channels) will be determined by the customer, up to a limit of 30 lines (60 channels).

A6.4.2 A group of ISDN 2 lines may be allocated to up to 5 separate DDI number ranges. Each DDI number range will be allocated as contiguous numbers and consists of a minimum of 10 numbers.

A6.4.3 The hunting default for ISDN 2 on the limited ETSI call control is sequential, but the option for cyclic is also supported.

The hunting between channels on incoming calls will be sequential, i.e. incoming calls will start at the first channel on every occasion. Optionally, cyclic hunting may be provided where incoming calls will be offered to the next free channel.

A6.4.4 Up to a maximum of 6 extension digits may be forwarded to the Basic Rate PBX as Called Party Number information. The type of number will be coded as “Unknown”.

A6.4.5 Exchange line facilities will be provided against the DDI main number rather than individual ISDN 2 lines. Note: By-pass numbers and the Three Party Calling Digital Select Service are not possible on ISDN 2 lines with DDI.

A6.4.6 For outgoing calls, the Basic Rate PBX may include the DDI extension number in the call request message (i.e. SETUP). The network will use this extension number to form the least significant digits of the Calling Line Identity to be delivered to the called party. If the PBX cannot supply the extension number the network will use the DDI Group Number as the Calling Line Identity to be delivered to the called party. If the network cannot verify that the PBX provided extension number is appropriate to the access then the DDI group number will be delivered instead.

A6.5 MULTIPLE SUBSCRIBER NUMBERING (MSN)

A6.5.1 MSN can be applied to one ISDN 2 line only and allows incoming calls to be routed directly to an individual piece of CPE that supports MSN, connected to the S Bus.

A6.5.2 The numbers allocated as MSNs will be contiguous and an option exists to subscribe to either 2 numbers or 10 numbers only.

A6.5.3 Up to a maximum of 6 digits of the MSN number may be forwarded to the CPE as Called Party Number information. The type of number will be coded as “Unknown”.

A6.5.4 Exchange line facilities will be provided against the main number of the access rather than individual MSN numbers i.e. Digital Select Services such as Call Diversion or CLIR will apply to all MSN numbers.

A6.5.5 For outgoing calls, the CPE may include part of or the whole MSN number in the call request message (i.e. SETUP). The network will use this number to form the least significant digits of the Calling Line Identity to be delivered to the called party. If the CPE cannot supply the MSN number the network will use the main number of the access as the Calling Line Identity to be delivered to the called party. If the network cannot verify that the MSN number is appropriate to the access then the main access number will be delivered instead.

A7 SERVICE CARE

Various types of service care are available on top of the default level, and can be provided for a charge.

- End of Annex A -

ANNEX B - NON-REGULATORY INFORMATION

B1 INTRODUCTION

This Annex provides information of a general nature which it is hoped will be useful to manufacturers of terminal apparatus.

B2 TERMINAL SELECTION

There are several different methods of terminal selection, on the passive bus, identified in the technical recommendations covering the I.420 interface. Manufacturers will doubtless have their own ideas on which of these is the best. BT advice is that the method of Multiple Subscriber Number (MSN) should become the normal mechanism.

ETSI document ETR 026:1992 (section 5.4 refers) may be referred to for further guidance.

The following should be noted for those ISDN 2 customers with 1 directory number for each of the two B-channels. Note: As notified in SIN 256, this service is not available on new orders for ISDN 2. This will not affect those customers with the preferred option of 1 directory number per basic access.

When an outgoing call is initiated from one B-channel to the other by a customer with 1 directory number per B-channel the customer may encounter an engaged condition. This is because when the terminal sends the SETUP message part of it is coded to specify "any channels". Thus, if the outgoing call has been allocated the B1 channel and the number of the B2 channel has been dialled the call will be successful. However, if the outgoing call has been allocated the B1 channel and the B1 channel is dialled the call will encounter an engaged condition and the appropriate indication will be given by the network.

B3 Designated Terminals

Designated terminals are those terminals designed to operate on the Power Source 1 (PS1) "restricted" supply provided by the NT1; terminals would only normally be expected to use this supply in the absence of a local power supply, e.g. during mains failure.

The following points should be noted about designated terminals:

- it is envisaged (but not mandatory) that designated terminals will use PS1 to provide a telephony capability in the absence of local power;
- PS1 "restricted" only provides 420mW;
- there are no mandatory conditions of use for designated terminals, however, if more than one designated terminal is connected to a single ISDN basic access, and more than one of those terminals is operating in the designated mode, the probability is that none of them will function correctly;
- whilst there are no mandatory conditions of use for designated terminals it is recommended that one such terminal is considered for each installation particularly where one or more of the terminals on that installation normally provide a telephony function.

Further details of designated terminals may be found in TBR 8.

B4 CAUSE DEFINITIONS

Where call clearing is initiated by the network it is recommended that the terminal should display the precise clearing cause received from the network rather than some other cause which has been generated by the terminal itself.

This recommendation is made to allow network provided ISDN call progress information to be correctly interpreted by CPE users and maintenance engineers.

When terminal equipments are clearing calls, the only valid 'Locations' to be used in the 'Cause' Information element are USER or Public network serving the local user.

B5 BASIC ACCESS HUNTING FACILITY

B5.1 Line hunting allows an incoming call to hunt over a number of ISDN 2 channels. This hunt group is formed from ISDN 2 lines and each line used contributes two channels to the total number of channels available. The hunt group is allocated one directory number and calls will be offered in a cyclic rotation, i.e. incoming calls will be offered to the next free channel and will not start at the first channel on every occasion as in the case of sequential hunting. The size of the hunt group will not exceed 60 channels, i.e. 30 ISDN 2 lines.

Note: ISDN 2 lines can not be mixed with ISDN 2e lines in the same hunt group, see SIN 261 Annex A 7.20.

B5.2 Exchange line facilities will be provided against the hunt group rather than individual ISDN 2 lines.

B6 ACCESS TO INTELLIGENT NETWORK (IN) SERVICES

An increasing number of services are being provided on the BT PSTN using the Intelligent Network architecture. These services could also be available on the ISDN. Some of these services require additional signalling using DTMF (Dual Tone Multi-frequency) signalling. In order for ISDN CPEs to have access to these services, it is recommended that CPE manufacturers provide DTMF capability in their terminal equipment in accordance with I-ETS 300 245-1 Section 5.4.

Note: some Digital Select Services are supported using the Keypad protocol specified in ETS 300 122-1 (e.g. MCI which is supported using the Keypad protocol signalling - see Clause A.5.7). The Keypad protocol requires the transfer of keypad operations (i.e. a sequence of numeric digits including * and #) via the D-channel in Keypad facility information element. For the support of all services, it is therefore necessary for the terminal equipment to be switchable between sending either DTMF or Keypad facility information elements. It is not recommended that terminal equipment generate both DTMF and Keypad facility information elements at the same time as a result of a single man machine interface interaction.

B7 MULTIPLE SIMULTANEOUS CALL ESTABLISHMENT/AUTOMATIC CALL GENERATION

It is recommended that for ISDN CPE which needs to establish multiple B-channel connections (e.g. channel aggregator equipment, Routers, etc), a 100 ms gap is placed between successive call establishment requests. This will ensure optimal processing within the network. If no gap is placed between successive call requests, congestion can occur in the network resulting in call establishment failure.

B8 ISDN CONNECTIONS USING SATELLITE LINKS

CPE designers need to take account that satellite links are used, particularly on international calls, in providing ISDN connections and should take account of the increased delay introduced by the satellite link. Whilst the preferred call routing will try and limit the use of satellite links to one, there are some destinations in the world and under some conditions (e.g. network congestion, fault recovery) where 2 satellite links will be used to provide the ISDN connection. Each satellite link can introduce a one-way transmission delay of 260ms (ref: Recommendation G.114) and hence applications in ISDN CPE need to be able to tolerate an additional round trip delay of 4*260 = 1.04s.

B9 CALL HOLD AND TERMINAL PORTABILITY

In accordance with the international standards, the network will not prevent:

- both calling and called users from suspending the call at the same time (in association with the Terminal Portability Digital Select Service), or
- one user suspending the call and the other user putting the call on hold at the same time.

Call charging will continue whilst a call is in the held or suspended state. Whilst the network monitors the suspended state, the network cannot monitor held calls. It is the user's responsibility to ensure that held or suspended calls are eventually cleared. It is therefore recommended that terminal equipment is designed such that it makes the user very aware of the presence of any held or suspended calls

B.10 CPE CONFIGURATION AFFECTING CALL CHARGES

The configuration of CPE, particularly those using automatic call generation, can significantly impact on customer's bills. It is important that the configuration is optimised for the customer's application and that the users are made aware of the importance of maintaining the configuration for optimal performance and costs.
If equipment is incorrectly configured the customer may receive unnecessary call charges. This incorrect configuration has shown itself in the following forms:

B.10.1 Long Duration Calls

It has been identified that some calls may not be cleared correctly by the user or may not be cleared due to mis-configuration of the terminal equipment. This results in long duration calls and higher than expected call charges.

For example:

- Connections may be maintained during idle periods for Remote LAN access
- ISDN used as a private circuit back up has routers that fail to release the call when the private circuit is restored.
- Customer may end a Video Conferencing call by turning off the monitor but actually, unintentionally leave the call connected.

It is recommended that CPE customers should be made aware of the importance of ensuring that their CPE, particularly some Videoconferencing equipment, Bridges and Routers etc have been configured to clear down correctly at the end of a call.

B.10.2 Short Duration calls (Automatic call generation)

It has been identified that some terminal equipment automatically makes calls using the B channels without the user's knowledge. Correct configuration of the terminal equipment can minimise the amount of automatic call generation. Some terminal equipment can be configured to make calls on a transactional basis instead of utilising the full minimum charging period. This may not be the most efficient way to configure the application and the customer could be better off by keeping the call "open" (toll saving) for the duration of the minimum call fee making better use of the time paid for.

For example:

- Calls made for each individual e-mail sent, instead of batching a number of e-mails together and making one call.
- Routers sending protocol "watchdog" packets in the background
- Maximum call length timers incorrectly set too short

It is recommended that terminal equipment customers are advised on the optimum configuration of their equipment and the correct call clearing method so as to minimise call charges.

B.11 ANONYMOUS CALL REJECTION (ACR)

The Telecommunication Data Protection Directive (Directive 97/66/EC) highlights the need for users to be able to reject incoming calls where the calling user has withheld their calling line identity (anonymous call rejection). International standards defining the anonymous call rejection function are being developed and the ETSI service description for ACR contains two options for ISDN:-

i) a network based solution, and

ii) a customer / CPE based solution.

The BT ISDN 2 (I.420) Service does not support network based ACR.

-End of Annex B-

ANNEX C - DIFFERENCES COMPARED TO ISSUE 9.0 OF SIN 171

This document provides a *brief* description of the *major* changes between this issue (9.2) of Suppliers' Information Note 171 and issue 9.0. Please refer to the main body of the document for full descriptions of each topic; particularly as a number of editorial changes have also been made throughout this issue of the document.

DESCRIPTION	REF. SECTION
Changes to reflect the completion of BT's withdrawal from service	2.2
Digital select services are renamed Digital Calling Features	A6
Repair levels are branded dependent on the Line of Business that supplies them to the customer	A7

Table C.1 - List of major changes from previous issue of SIN 171

- End of Annex C -